UNDERSTANDING
your operational objectives

TACKLING
your complex challenges

DELIVERING
your global success stories

LNG FIELD DEVELOPMENT AND FACILITIES

FUGRO GROUP
Developing a world-class LNG project involves complex challenges, often in the harshest environments, where substantial investment demands that projects are delivered safely, responsibly, on time and within budget. Success relies on technical excellence and high quality project management, a ‘can do’ approach and an intimate knowledge of the commercial, logistical and regulatory constraints that accompany LNG facilities development.

INTRODUCTION

LNG projects involve unique technical challenges which Fugro has the experience and expertise to tackle. For example, there are metallurgical and engineering issues associated with temperature differentials of 200°C and refrigerant compressor trains require precise structural and dynamic loading. Major volumes of cooling water can raise marine environmental concerns, and the public perception of safety must also be addressed.

Fugro fully understands the LNG business and the critical issues that differentiate us from less experienced companies. We combine unique skills to offer a complete life-of-project solution, from conceptual planning, through FEED, EPC and start-up, to long-term operations and maintenance.

THE FUGRO GROUP

In diverse locations and environments, onshore and offshore, Fugro companies acquire and interpret earth and engineering data, provide specialist consultancy support, and assist in the discovery, identification, extraction and distribution of natural resources.

Fugro works with you, supporting each stage of your operation, identifying and overcoming environmental, logistical and technical challenges. Our knowledge and resources play a key role in the safe, reliable and responsible operation of facilities.
LNG FIELD DEVELOPMENT AND FACILITIES SERVICES

Fugro is a quality international company specialising in integrated geotechnical, environmental, survey, and positioning services to meet the demanding requirements of large-scale LNG projects. These services have already been deployed across Africa, Asia, the Americas, Europe, and Australia.

OUR SERVICES
Fugro is the world’s leading service provider for the collection and interpretation of data relating to the Earth’s surface and sub-surface, and for associated services and advice in support of infrastructure development on land, along the coast and on the seabed. Our experience in supporting LNG facilities includes:

- Liquefaction plants
- Receiving and regasification plants
- Floating facilities
- Gas pipelines
- Upstream gas production both offshore and onshore

Our specialist geo-services - often integrated into a single-source package - are utilised by the downstream processing and LNG industries, as well as for pipeline transportation, storage, and field development. For many of the largest North American and international oil and gas projects, we provide onshore and offshore geotechnical and geophysical services, land and airborne surveys, geophysical and metocean services.

QUALITY, SAFETY, AND ENVIRONMENT
We are committed to ensuring that our employees are the best in the business, through training and personal development and through our world-wide culture of excellence. Through investment in people, technology and equipment, we ensure that operations are carried out with uncompromising respect for quality, safety and the environment.

Our commitment to HSEQ is evident not just through the application of mandated policies, regulations and laws, but in our philosophy, our approach to problem solving and our corporate-wide support of sustainable development.

RISK MITIGATION
LNG developments involve owners, contractors, and service specialists working together to mitigate the risks associated with locating facilities and infrastructure. Susceptibility to earthquakes, tsunamis, complex soil, and geologic conditions, both onshore and offshore, can present real challenges.

Solving these issues relies on cost-effective design being implemented across the project, which, in turn, relies on sound professional advice and quality data collection. This can mean the difference between cost-effective, efficient design and under-design or over-design with huge capital cost implications.

Thanks to Fugro’s proven expertise in consulting and data collection, together with its technical risk management service, our services are in demand around the world, in challenging environments, managing local content, providing comprehensive project management and risk mitigation.

Fugro Risk Management

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LNG FIELD DEVELOPMENT AND FACILITIES SERVICES

Throughout the development of LNG facilities, we acquire, interpret, model and analyse data that contributes to a clearer understanding of the geological, geophysical and environmental conditions that apply. This enables our clients to evaluate strategies and proceed with solutions based on reliable measurements and assessment.

PRE-FEASIBILITY AND FEASIBILITY
LNG project success depends on selecting the right site, getting the preliminary economic evaluations right - considering all potential options - and then making the correct decision.

Key to achieving this is evaluating geological hazards, seismic risk, the suitability of soils, and metocean events, along with preliminary pipeline routeings and subsea integrity. Our state-of-the-art terrestrial and marine tools and high-level consultancy expertise have been helping clients to mitigate these risks and overcome the unique challenges of complex LNG developments for over five decades.

- Probabilistic seismic hazard assessment (PSHA studies)
- Tsunami studies
- Geological mapping
- Review of satellite imagery
- Soil stability assessment, liquefaction, and subsidence
- Plant siting and pipeline routeing evaluation
- Geohazard and fault rupture hazard assessment
- Geophysical evaluations for siting, routeing, and material sourcing
- Hydrological and hydrogeological studies and modelling
- Marine metocean studies, hindcast, current predictions, and wave actions
- Weather forecasting
- Environmental surveys, measuring and sampling
- LNG permit application support
- Quantitative risk assessment
- GIS data management

FRONT END ENGINEERING DESIGN (FEED)
Efficient, cost-effective engineering design is important to maintaining the quality and reliability of eventual construction. We ensure that the FEED phase benefits from an accurate interpretation of quality data.

Our global network of people, equipment and technology provide integrated capabilities with a single point responsibility package of terrestrial and marine services.

- Onshore, nearshore, and offshore drilling
- Cone penetration testing (CPT)
- Laboratory analysis of soils and rock
- Interpretation and analysis of geotechnical field works
- Aerial imagery and positioning
- LIDAR topographic mapping and positioning
- Detailed geophysical surveys (terrestrial and airborne)
- Large area mapping, ice measurement, and land use studies
- Shore approach surveys (SHOALS)
- Bathymetric and geophysical surveys (single and multibeam)
- High resolution sub-bottom seabed profiling
- Magnetometer surveys
- Side scan sonar
- Engineering analysis for LNG facilities onshore
- Engineering analysis for offshore pipeline routeings, well sites, subsea infrastructure and anchoring systems
- Site improvement engineering
- Detailed oceanographic predictions
- Management of third parties (local content)
- GIS data management
ENGINEERING, PROCUREMENT, CONSTRUCTION (EPC)

Fugro is a recognised specialist in LNG engineering support and construction quality control. We deploy dedicated vessels, jack-up barges, and equipment to precisely position, drill, and test the integrity of construction works onshore, nearshore, and offshore.

- Detailed engineering support for foundations, breakwaters, trestles, pipelines, LNG tanks, anchors, and offshore facilities
- Drilling, cone penetration testing, and geotechnical activities in the field
- Laboratory testing and analysis
- Precise positioning onshore and offshore
- Dimensional control studies during construction
- Construction and installation support
- Pile load testing (static, dynamic, and Osterberg Cell®)
- Fill control
- Foundation observation and testing
- Soil, concrete, and asphalt quality control
- Non-destructive testing of metals and other materials
- QA/QC documentation during construction
- GIS data management

START-UP AND OPERATIONS

Accurate data acquisition, professional advice, and first-class engineering and construction support provides the confidence you need to get your LNG facilities up and running on time and on budget.

Thereafter, our detailed monitoring and data management services ensure that projects continue to operate safely and successfully over the long-term.

- Geo-monitoring of structures and infrastructure
- Slope integrity studies
- As-built surveys
- Data management

From preliminary investigations and detailed site surveys; through design, engineering and construction support, to the eventual operations and maintenance of LNG facilities, Fugro is a long-term partner you can trust.
GLOBAL CAPABILITY SUPPORTING LOCAL BUSINESS

For over 50 years, Fugro has played a vital role in the world’s energy industries, and now has a presence in almost 60 countries. Our regional personnel provide the local knowledge, rapid response and in-depth understanding of business practices and logistics that customers look for. They are fully supported by Fugro’s international network of offices, with 12,000 staff, one of the largest fleets of survey, geotechnical and metocean research vessels, and the most sophisticated data gathering tools enabling us to undertake major LNG projects, wherever they are located in the world.
FUGRO'S EXPERIENCE

- Fugro LNG projects
- Fugro offices